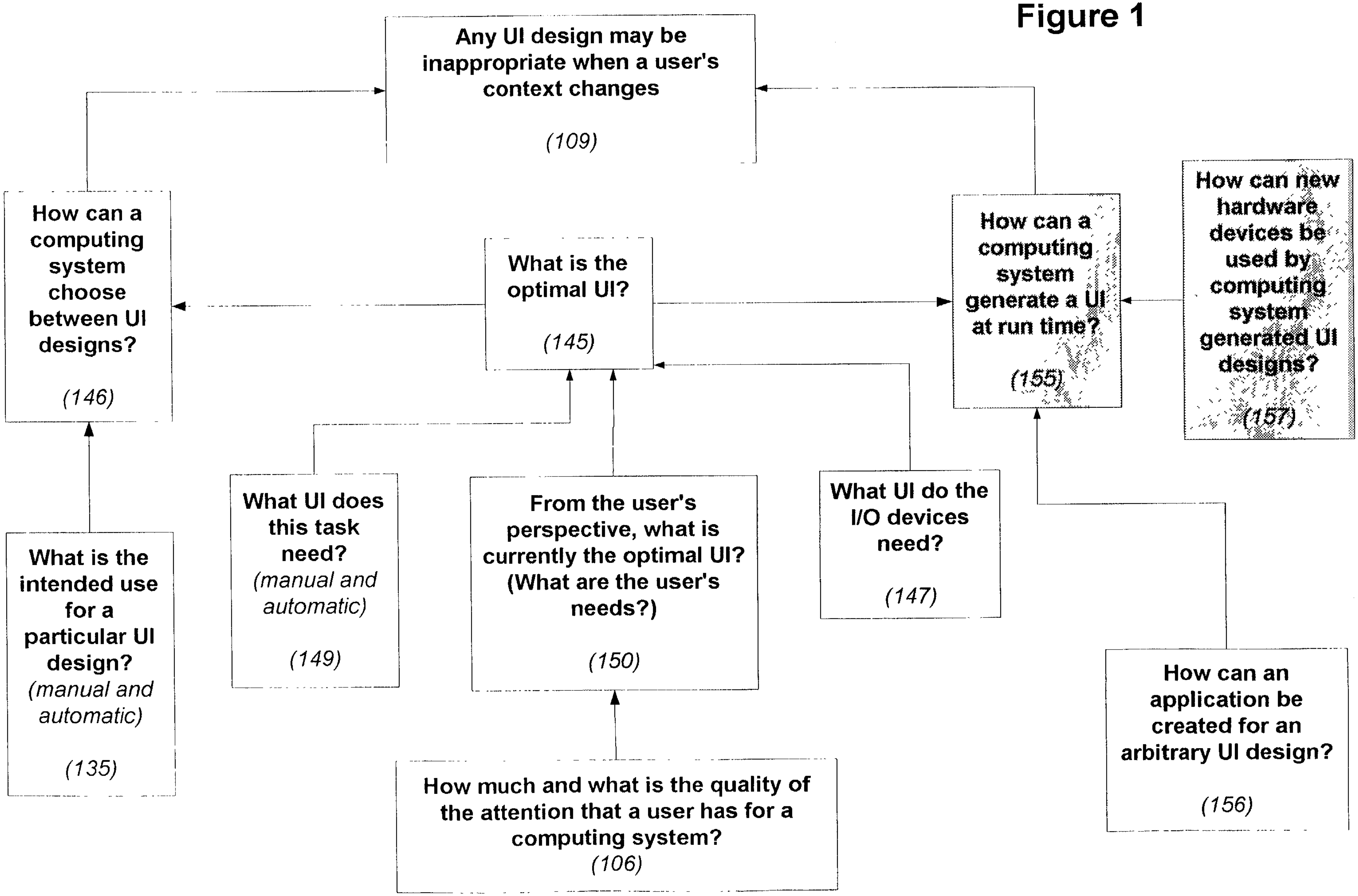
Figure 1


Any UI design may be inappropriate when a user's context changes
(109)
How can a computing system choose between UI designs?
(146)
What is the optimal UI?
(145)
How can a computing system generate a UI at run time?
(155)
How can new hardware devices be used by computing system generated UI designs?
(157)
What is the intended use for a particular UI design? (manual and automatic)
(135)
What UI does this task need? (manual and automatic)
(149)
From the user's perspective, what is currently the optimal UI? (What are the user's needs?)
(150)
What UI do the I/O devices need?
(147)
How can an application be created for an arbitrary UI design?
(156)
How much and what is the quality of the attention that a user has for a computing system?
(106)

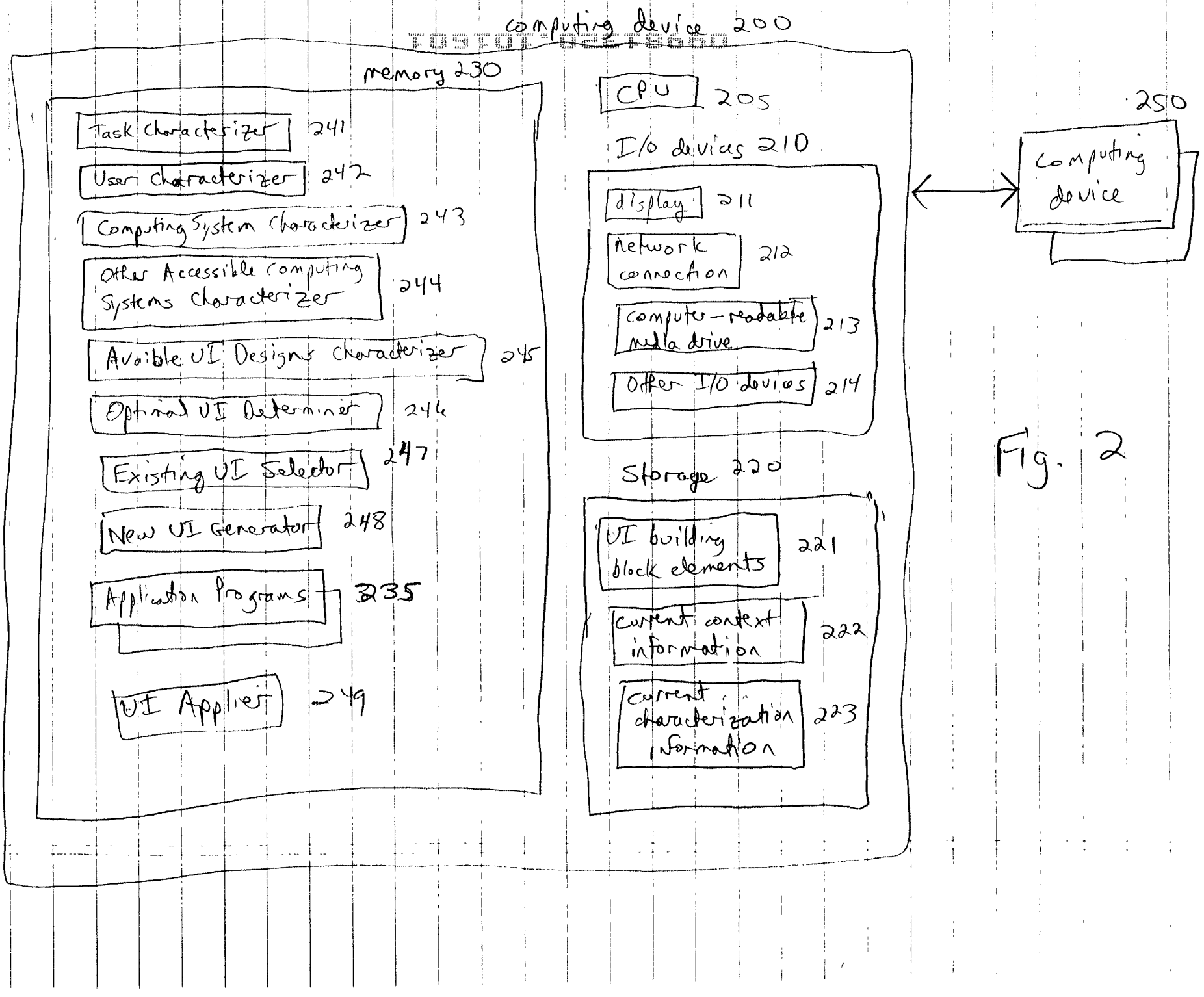

computing device 200
memory 230
Task characterizer 241
User characterizer 242
Computing System characterizer 243
Other Accessible computing Systems characterizer 244
Avoible UI Designs characterizer 245
Optimal UI Determiner 246
Existing UI Selector 247
New UI Generator 248
Application Programs 235
UI Applier 249
CPU 205
I/O devices 210
display 211
network connection 212
computer-readable media drive 213
Other I/O devices 214
Storage 220
UI building block elements 221
current context information 222
current characterization information 223
250
computing device

Fig. 2

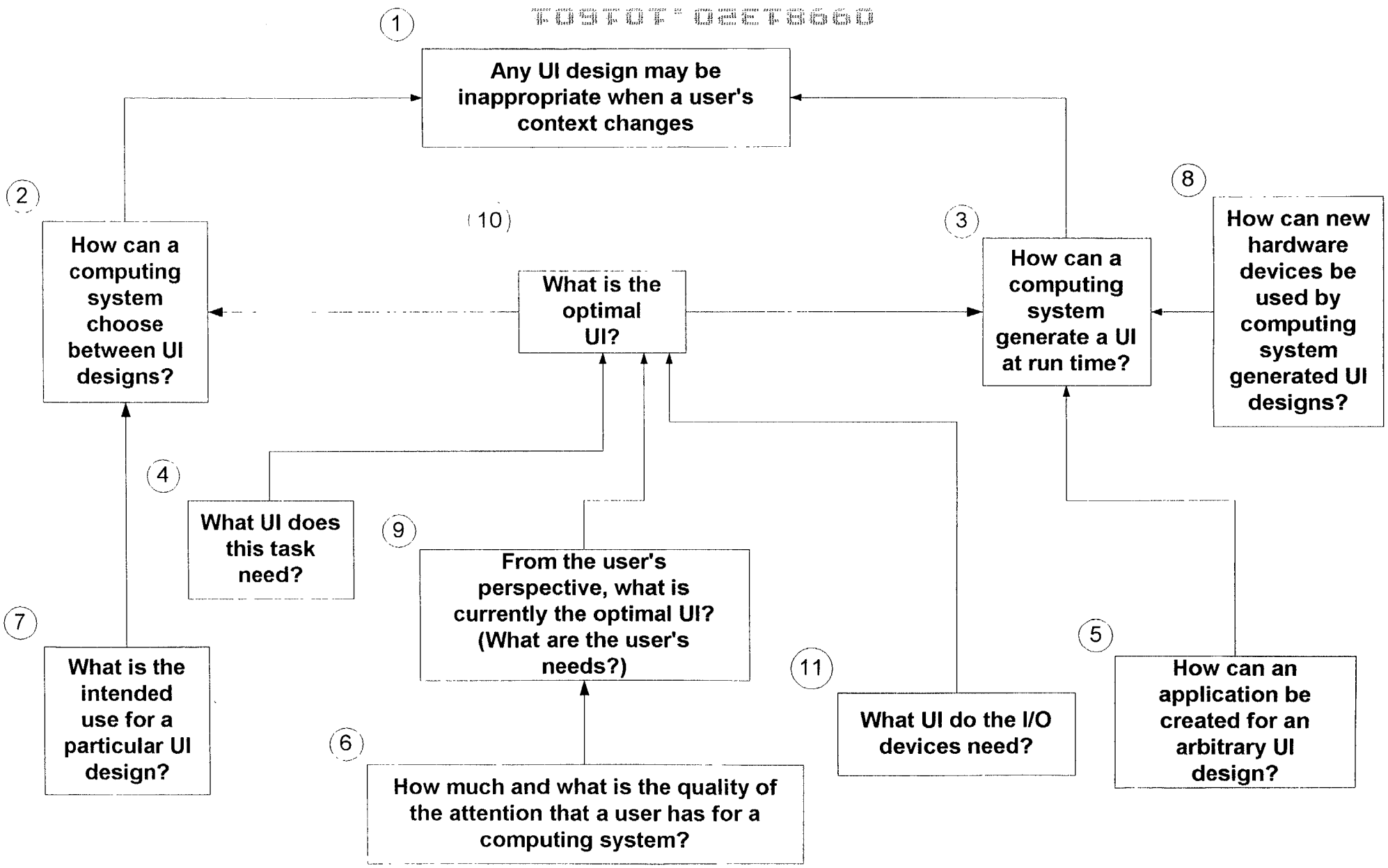

1
Any UI design may be inappropriate when a user's context changes
2
How can a computing system choose between UI designs?
10
What is the optimal UI?
3
How can a computing system generate a UI at run time?
8
How can new hardware devices be used by computing system generated UI designs?
4
What UI does this task need?
9
From the user's perspective, what is currently the optimal UI? (What are the user's needs?)
7
What is the intended use for a particular UI design?
6
How much and what is the quality of the attention that a user has for a computing system?
11
What UI do the I/O devices need?
5
How can an application be created for an arbitrary UI design?

Figure 3

Optimal UI Requirements

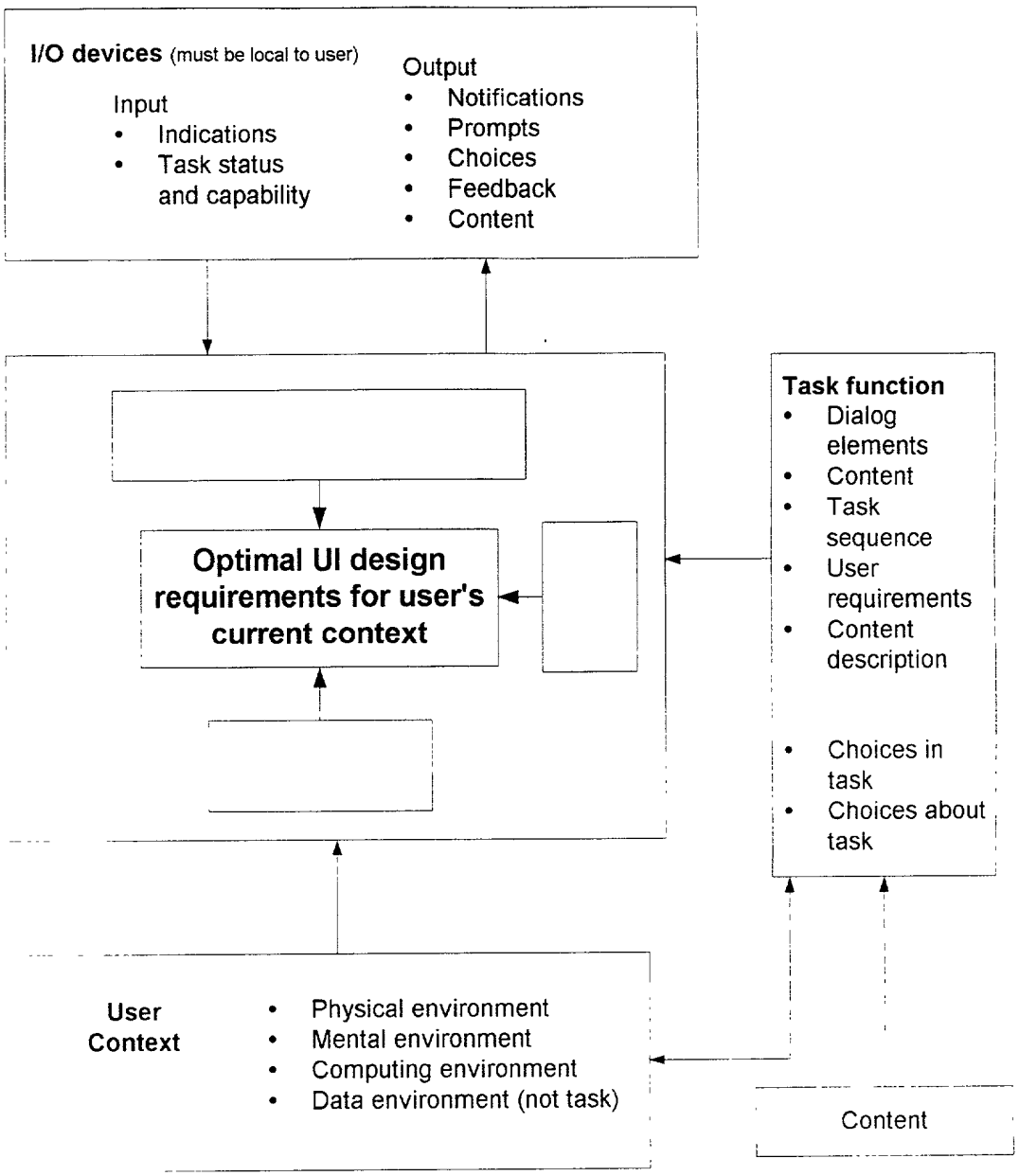


Figure 4

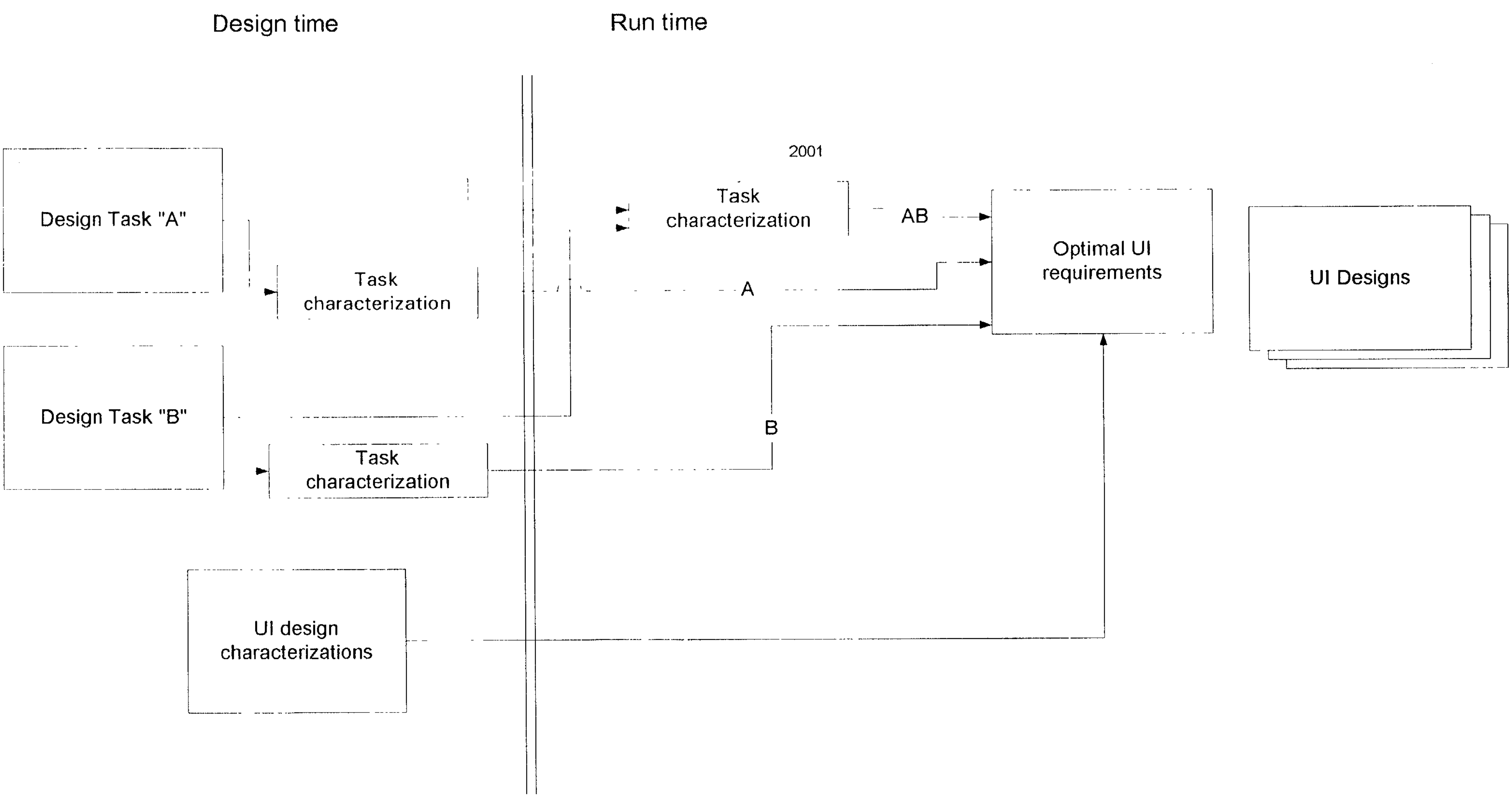

Design time
Run time
Design Task "A"
Design Task "B"
Task characterization
Task characterization
UI design characterizations
2001
Task characterization
AB
A
B
Optimal UI requirements
UI Designs

Figure 5

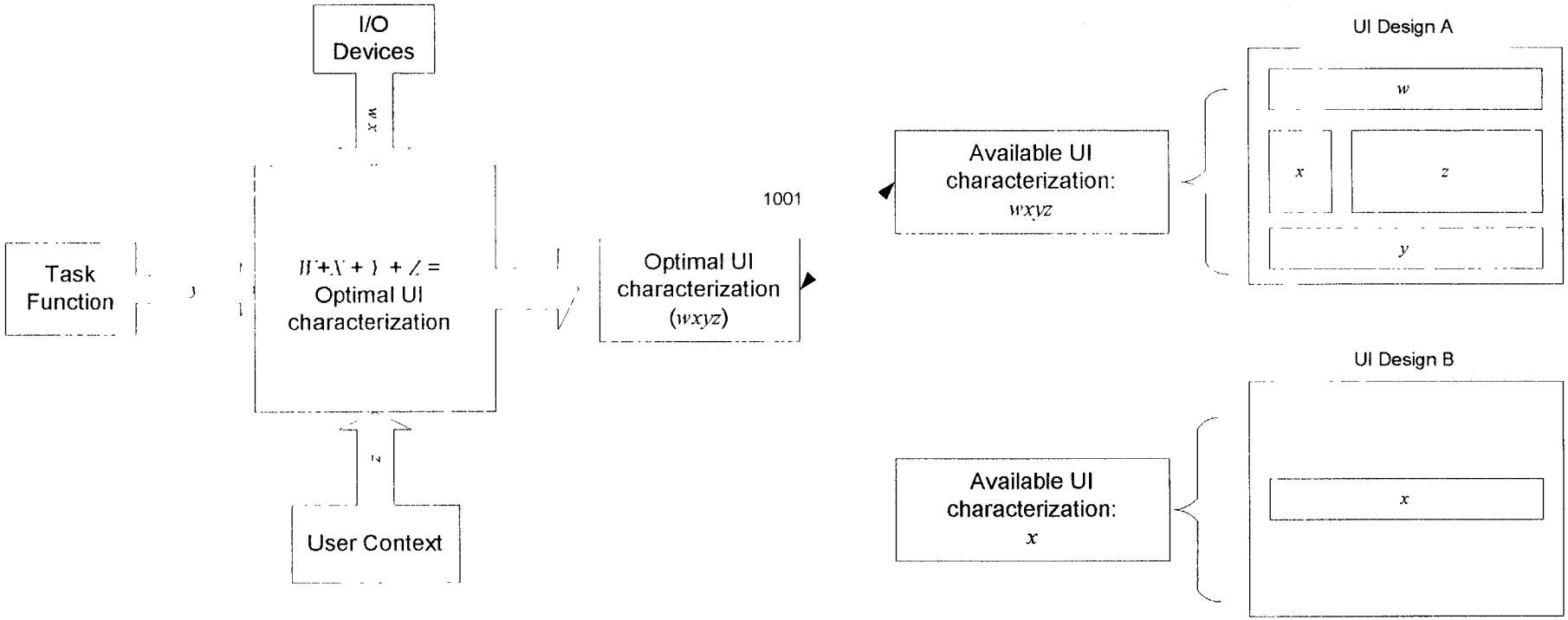


Figure 6

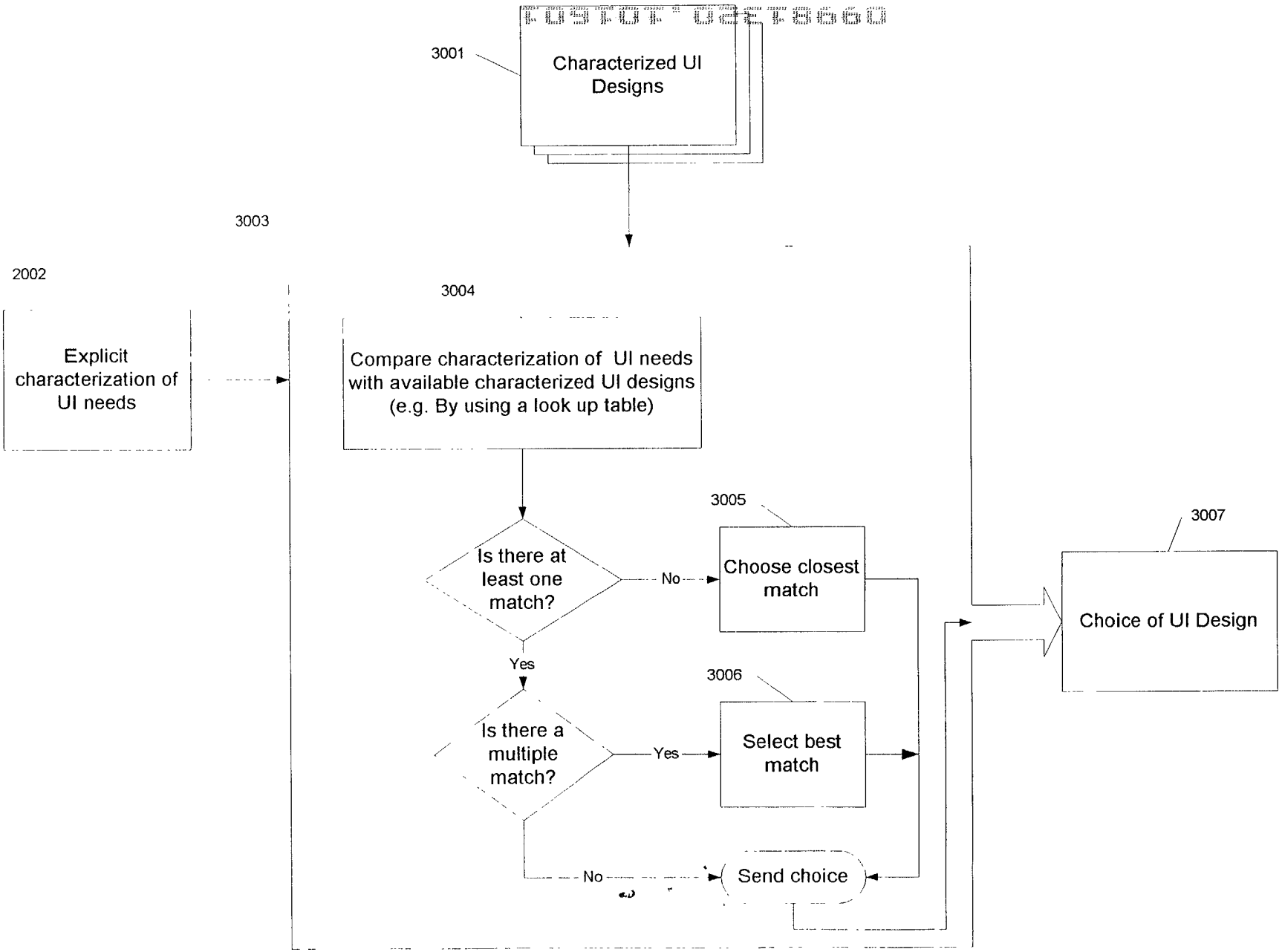

3001
Characterized UI Designs
3003
2002
3004
Explicit characterization of UI needs
Compare characterization of UI needs with available characterized UI designs (e.g. By using a look up table)
3005
Is there at least one match?
No
Choose closest match
3007
Choice of UI Design
Yes
3006
Is there a multiple match?
Yes
Select best match
No
Send choice

Figure 7

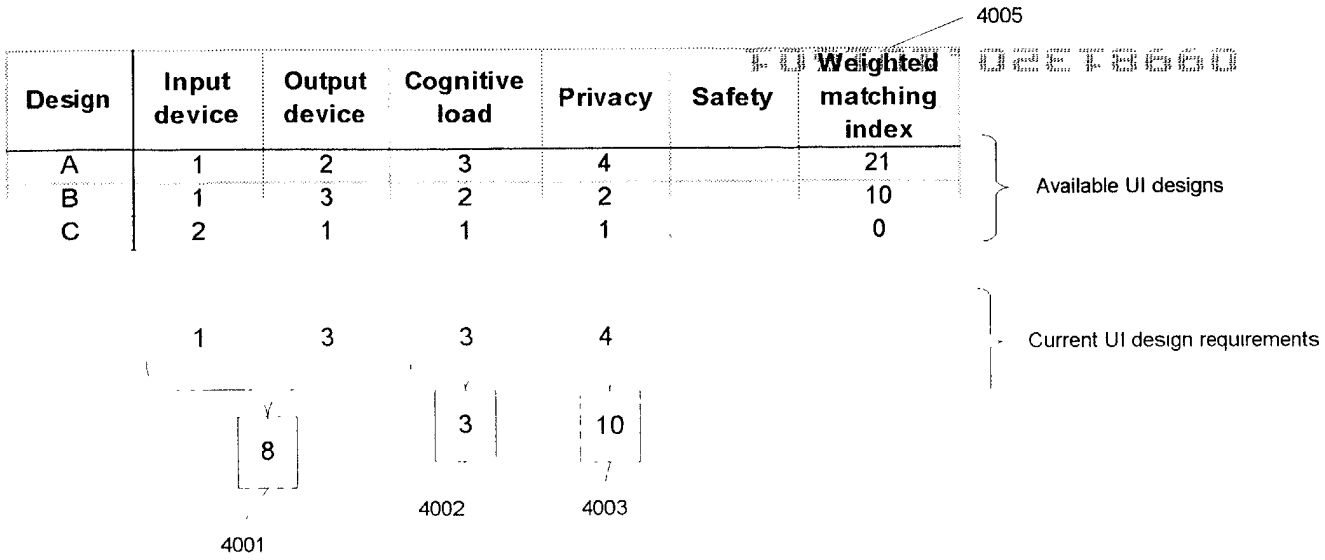

4005
Design
Input device
Output device
Cognitive load
Privacy
Safety
Weighted matching index
A 1 2 3 4 21
B 1 3 2 2 10
C 2 1 1 1 0
Available UI designs
1 3 3 4
Current UI design requirements
8
3
10
4001
4002
4003

Figure 8

Design	Input device	Output device	Cognitive load	Privacy	Safety	Weighted matching index
A	1	2	3	4		21
B	1	3	2	2		10
C	2	1	1	1		0
D	2	2	2	2	5	22

Available UI designs

3	3	1	4	5

Current UI design requirements

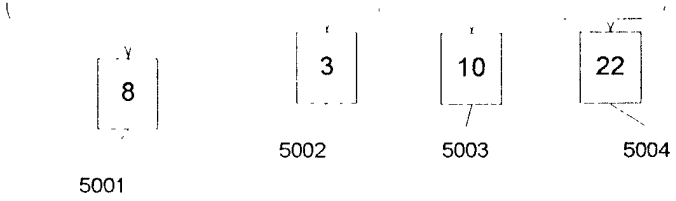


Figure 9

Design	Input device	Output device	Cognitive load	Privacy	Safety	Weighted matching index
A	1	2	3	4		21
B	1	3	2	2		10
C	2	1	1	1		0
D	2	2	2	2	5	22

Available UI designs

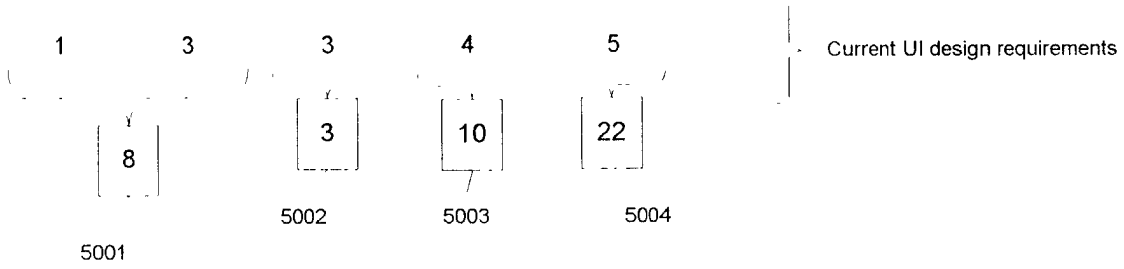


Figure 10

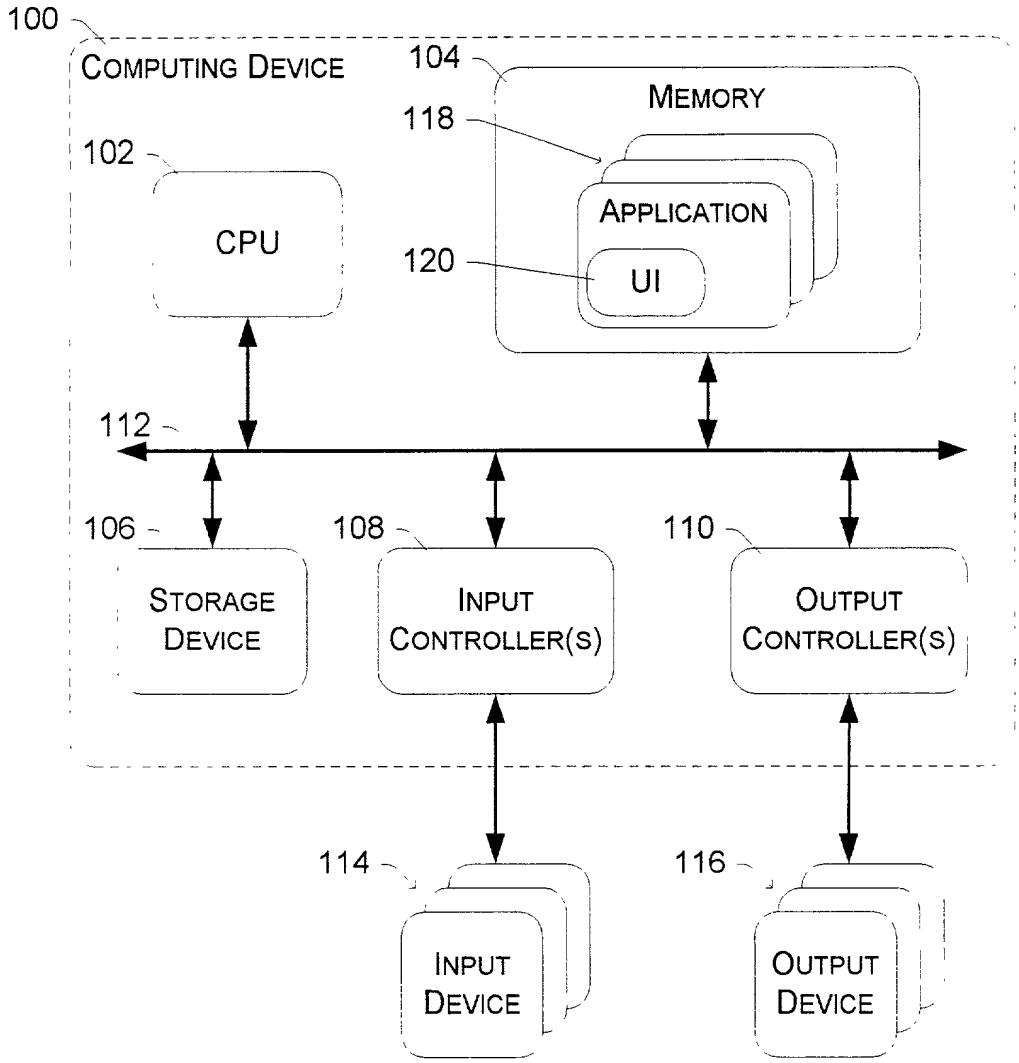

100
COMPUTING DEVICE
104
MEMORY
118
102
CPU
APPLICATION
120
UI
112
106
108
110
STORAGE DEVICE
INPUT CONTROLLER(S)
OUTPUT CONTROLLER(S)
114
116
INPUT DEVICE
OUTPUT DEVICE

Fig. 11

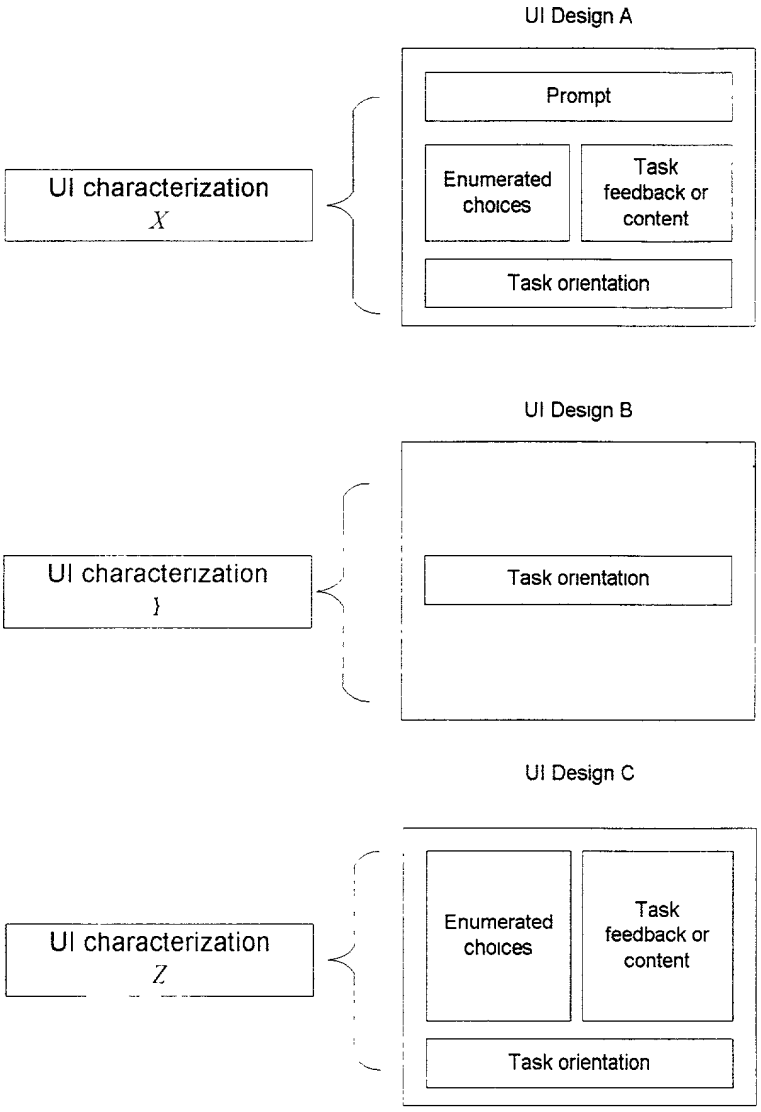

UI Design A
UI characterization
X
Prompt
Enumerated choices
Task feedback or content
Task orientation
UI Design B
UI characterization
Y
Task orientation
UI Design C
UI characterization
Z
Enumerated choices
Task feedback or content
Task orientation

Fig. 12

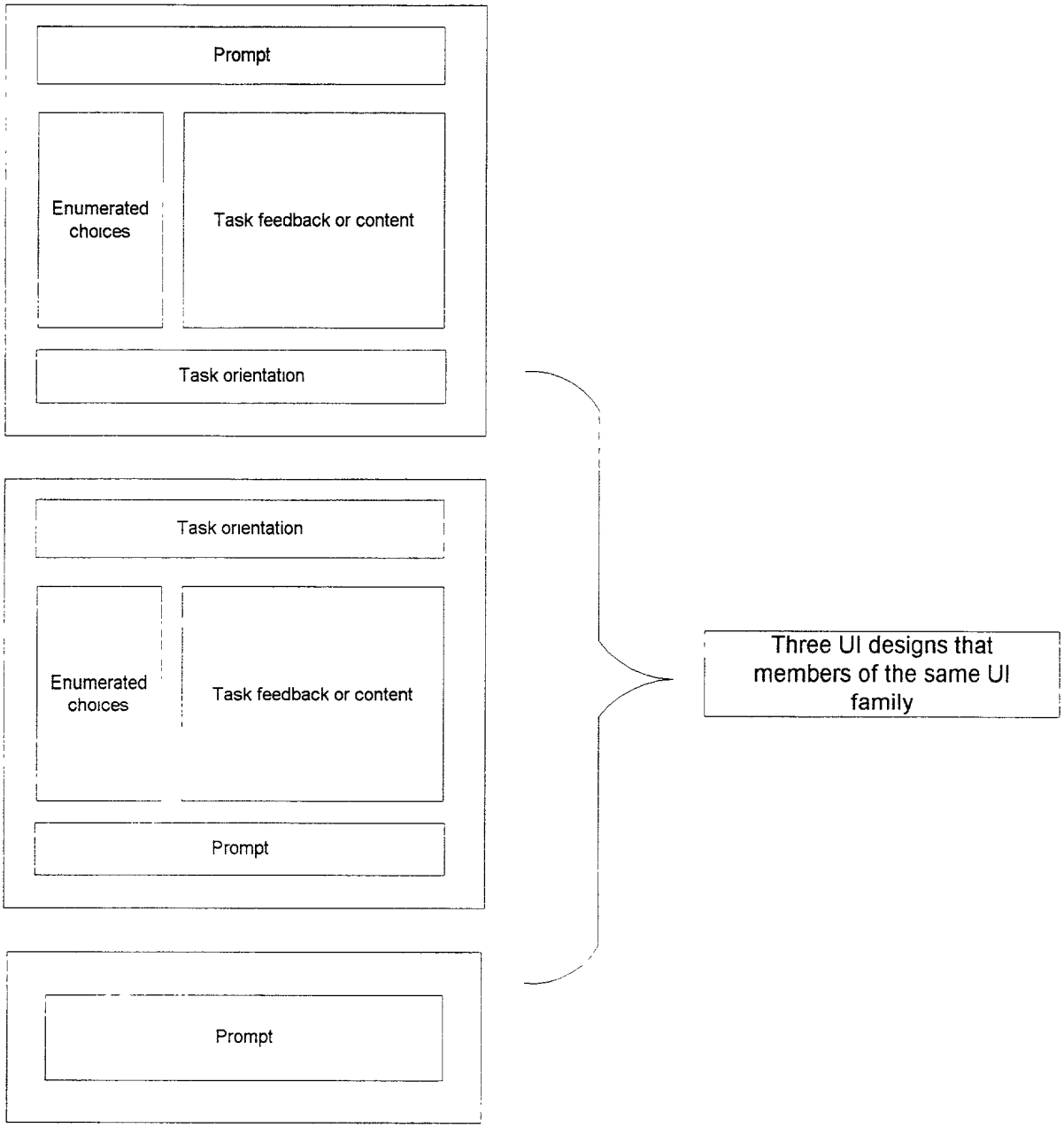

Prompt
Enumerated choices
Task feedback or content
Task orientation
Task orientation
Enumerated choices
Task feedback or content
Prompt
Prompt
Three UI designs that members of the same UI family

Fig. 13

Basic Structure

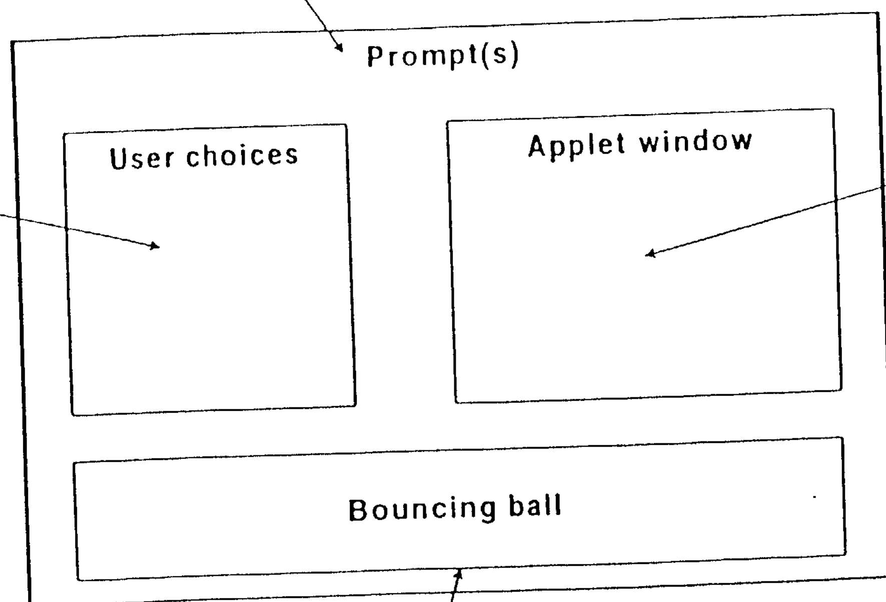
General UI assumption
So long as something is specified by the Applet, it's presented by the UIF.

PROMPT(S)
Purpose The goal plus task Provide minimal user guidance about what to do next at each step (state) of the Applet Can be audio, video, LCD, etc

Format Under UIF's sole control for look, feel, and interaction Content of the prompt(s) is provided by the Applet How the prompt is presented (what combo of audio, video, LCD, etc) is ultimately derived from the CM

USER CHOICES
Purpose Provide options for user to choose from to complete each step (state) of the Applet

Format Under UIF's sole control for look, feel, and interaction Choices in the list are received from the Applet. How the choices are presented (e g , verbally, visually, etc) is ultimately derived from the CM



APPLET WINDOW
Purpose To clarify or amplify the meaning of a choice or state.

Format Currently specified by Applet for control for look, feel, and content; ultimately to be under UIF's sole control for look, feel, and content as specified by Applet

BOUNCING BALL
Purpose Present all states (steps) of an Applet at once as a "cheat sheet" of what to do or expect next For those familiar with the Applet, the bouncing ball guides the user through the Applet at a very high level, with a minimum of prompting

Format Under UIF's sole control for look, feel, and interaction Content of the state label(s) is provided by the Applet How the states are presented is ultimately derived from the CM

Fig. 14

Key
UIF User Interface Framework
CM Characterization Module
Applet Any software developed to run within the Tangis [Product] environment